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Superconductivity of lanthanum revisited PETER LOEPTIEN, LIHUI ZHOU, JENS WIEBE, ALEXANDER AKO KHAJETOORIANS, ROLAND WIESENDANGER, University of Hamburg — The thickness dependence of the superconductivity in clean hexagonal lanthanum films grown on tungsten (110) is studied by means of scanning tunneling microscopy (STM) and spectroscopy (STS). Fitting of the measured spectra to BCS theory yields the superconducting energy gaps from which the critical temperatures are determined. For the case of thick, bulk-like films, the bulk energy gap and critical temperature of dhcp lanthanum turn out to be considerably higher as compared to values from the literature measured by other techniques. In thin films the superconductivity is quenched by the boundary condition for the superconducting wavefunction imposed by the substrate and surface, leading to a linear decrease of the superconducting transition temperature as a function of the inverse film thickness. This opens up the possibility to grow lanthanum films with defined superconducting properties.

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